Spatial Characterization of the Horse Mackerel (*Trachurus trachurus*) Fisheries in Northern Spain

Ceballos E. [1], Punzón A. [1], and Rodríguez-Basalo A. [1]

1 Instituto Español de Oceanografía. Promontorio de San Martín SN. 39080 Santander. PO BOX 240.

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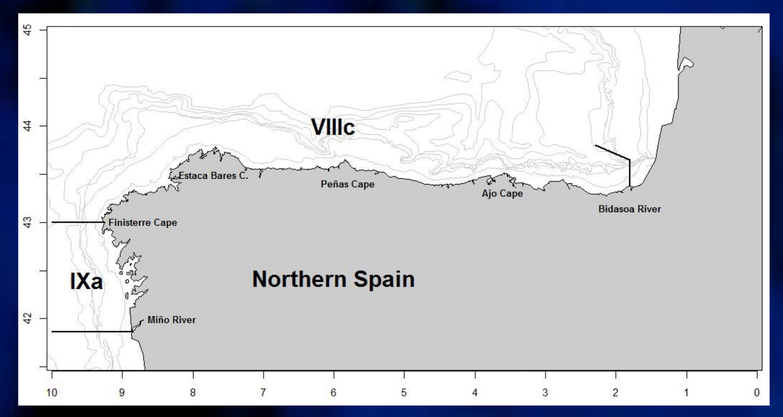
Introduction

Horse mackerel (*Trachurus trachurus*) is one of the main species of fishing interest in the waters of the Iberian Peninsula. Various trawl and purse seine fisheries targeting this resource have been developed in the north of Spain; furthermore, it appears as by catch in bottom long line and gillnets fisheries.

This study will allow us to characterize geographically each of the fisheries targeting horse mackerel and to analyze its intra and inter annual variations with the aim of being able to identify in the future the anthropogenic and environmental processes associated with fisheries.



Material and Methods

The spatial distribution of the activities of the industrial fleet has been analysed using the information contained in logbooks and VMS, provided by the Spanish Ministry of Agriculture, Food and Environment (MAGRAMA, for its initials in Spanish).

All fishing activities targeting this species (2007-2010) have been identified in this study using the logbooks information.

The processing techniques used were the described by Hintzen et al., 2011.

The time interval and the Euclidean distance between successive signals were obtained, and each of these values was associated with the first signal of each corresponding pair; when the time interval between signals was longer than four hours, the beginning and end of each fishing expedition was determined; the average speed of the ship was calculated using the interval between successive signals (pings); ships for which less than ten signals in a year were available were eliminated; signals recorded within a distance of three miles or less from the closest fishing harbour were also eliminated. Each signal coinciding with a fishing trip registered in the logbooks (according to the ship code and the date of capture) was associated with a fishing gear and a fishing tactic.

Based on the distribution of frequencies of average speeds, a working range for each fishing gear was defined, and all signals with associated velocities out of the working range were eliminated.

Target species:
Trachurus trachurus

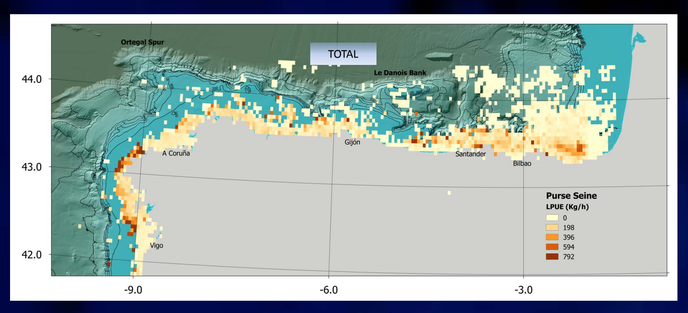
To identify the fishing tactics, classification techniques were applied. For fishing tactic characterization we used the "fishing day" for effort and "tones" for landings

To classify trips, the non-hierarchical cluster technique CLARA (clustering large applications) was used based on a partition around medoids (PAM)

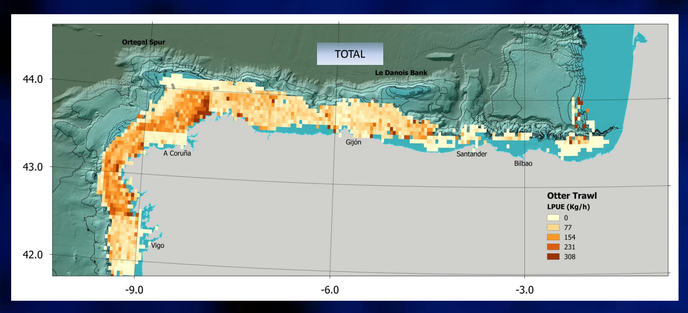
The spatial effort estimation was carreid out using a grid spacing of 5 km
For spatial characterization was used fishing time in hours for effort.

Results

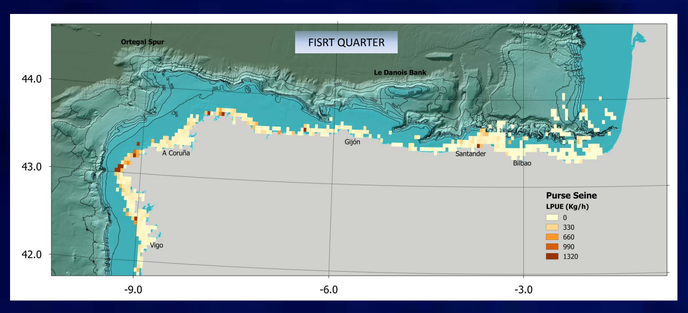
Spatial Distribution of the Fishing Tactics targeting Horse Mackerel (HOM)

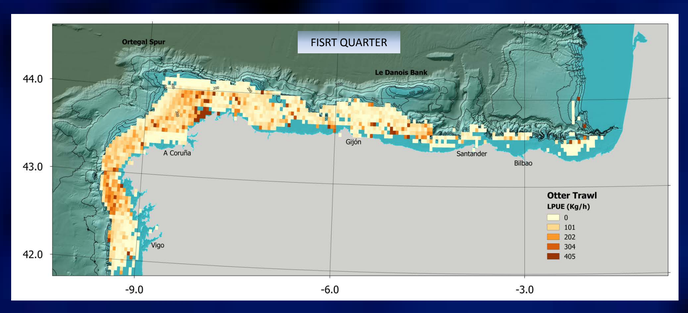


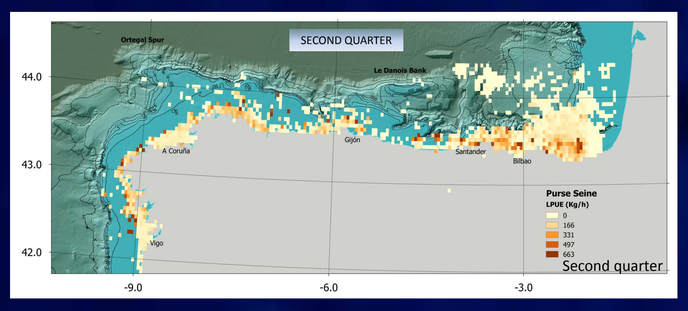
Purse Seine

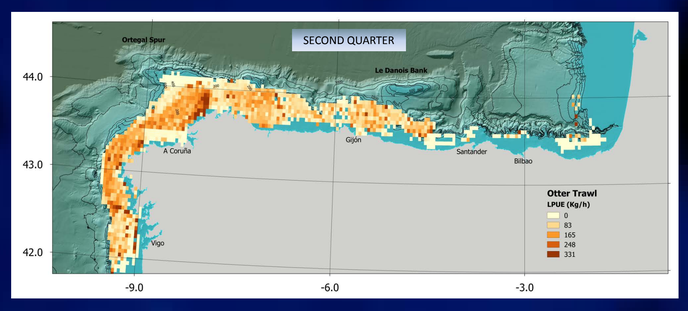


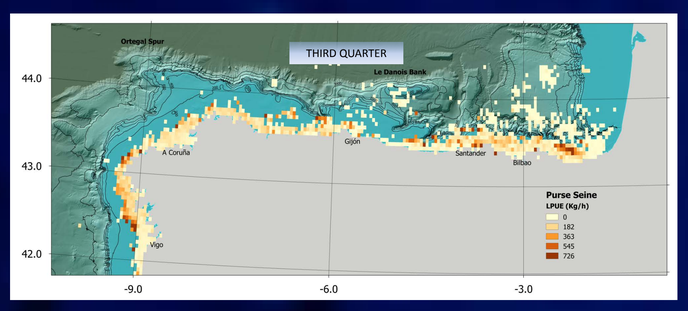
Otter Trawl

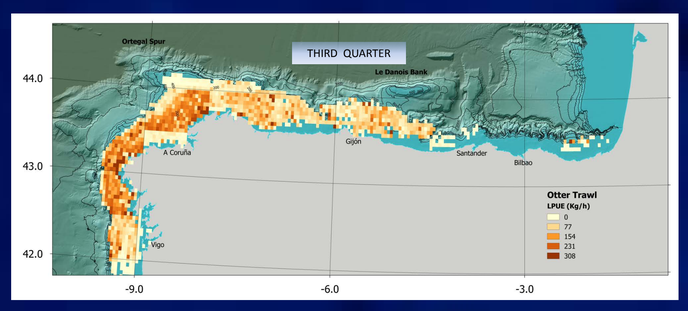


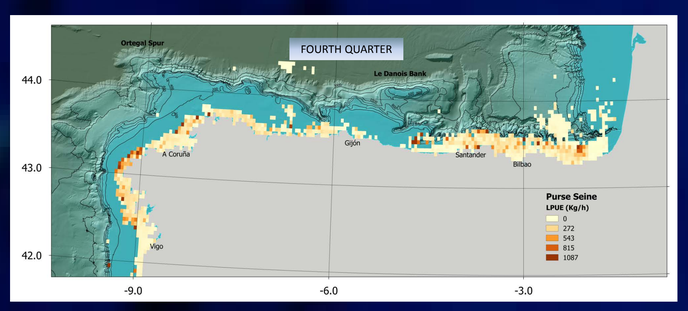


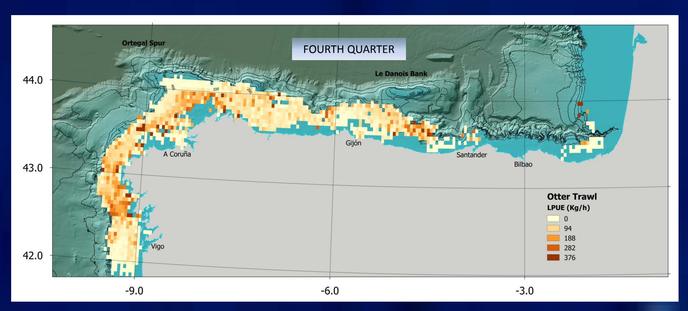




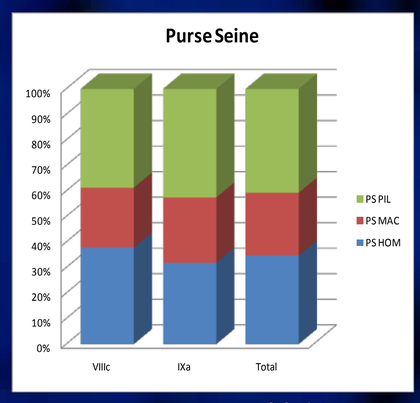


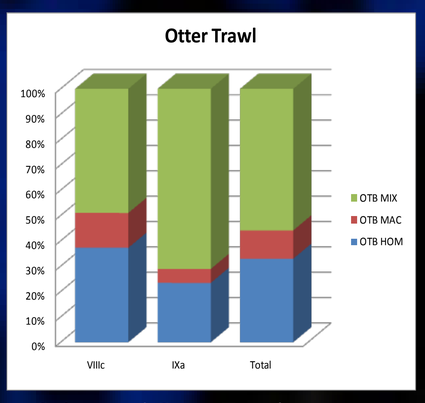






Fishing Tactics from Otter Trawl (OTB) and Purse Seine (PS)



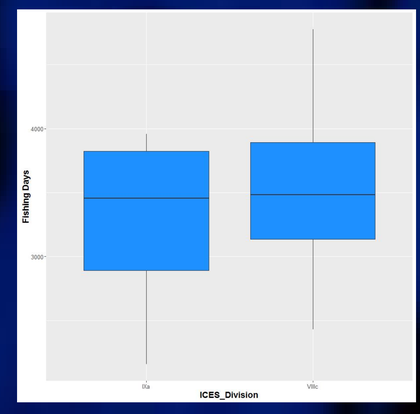


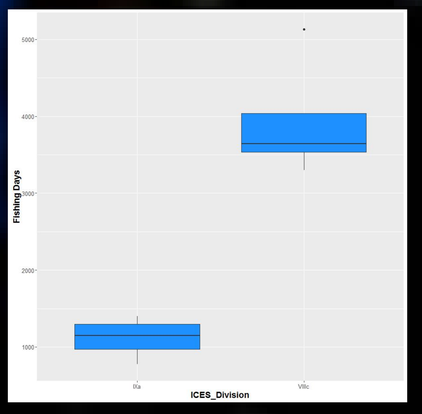
Importance of fishing tactics (%) Purse Seine and Otter Trawl

Fishing Tactics Targeting Horse Mackerel (HOM)

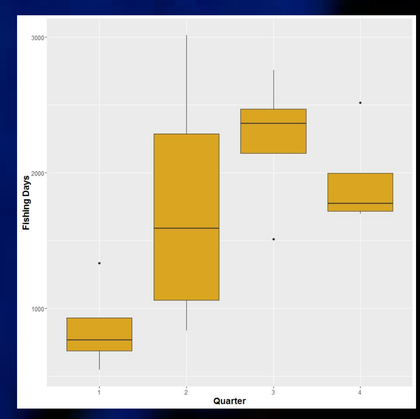
Purse Seine

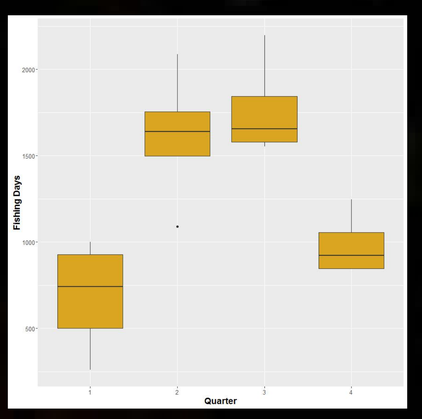
Otter Trawl





Fishing effort by ICES Area





Fishing effort by quarter

Hintzen, N., Bastardie, F., Beare, D., Piet, G., Ulrich, C., Deporte, N., Egekvist, J. & Degel, H. , 2011. VMStools: open-source software for the processing, analysis and visualization of fisheries logbook and VMS data . Fisheries Research, 31-43,115-116